

3/Pvt

1 CONTROL DRIVE WITH ADJUSTABLE POTENTIOMETER

2

3 Related Art

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5 The invention is based on a control drive according to the definition of the
6 species in Claim 1.

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8 A control drive is made known in EP 681 359 A1 that has an electric circuit. This
9 control drive does not have a potentiometer, however, that makes it possible to
10 achieve a very exact alignment between any position of a driven wheel and a
11 position of the potentiometer resulting therefrom by means of the potentiometer
12 housing, so that the potentiometer is located in a home position.

13

14 A potentiometer is made known in US-PS 5,794,766. The potentiometer cannot
15 be rotated relative to a base plate, however, in order to carry out the alignment
16 described above.

17

18 US-PS 5,580,278 discloses a detent toothed that cannot be rotated, however.

19

20

21 Advantages of the Invention

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23 In contrast, the control drive according to the invention having the characterizing
24 features of Claim 1 has the advantage that a home position of the potentiometer
25 is adjustable in simple fashion at a specified position of the driven wheel.

26

27 Advantageous further developments and improvements of the control drive
28 named in Claim 1 are possible due to the measures listed in the dependent
29 claims.

30

- 1 It is advantageous when the housing of the control drive forms a detent toothed
- 2 with the housing of the potentiometer, because this secures the potentiometer
- 3 against rotation when installed.

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5 An advantageous embodiment of the invention is given by means of a
6 longitudinal hole in the potentiometer housing, because the detent toothing is
7 then realized in an elastic design and rotation of the housing during alignment is
8 simplified.

9

10 It is further advantageous that electrical connections of the potentiometer form a
11 serpentine contour, because this allows length to be offset as necessary when
12 the potentiometer housing is rotated.

13

14 It is particularly advantageous when all parts to be installed in the housing of the
15 control drive are installable in one installation direction, because this simplifies
16 and shortens the assembly process.

17

18 An advantageous installation of the control drive is made possible by the fact that
19 an electric motor and/or the transvers worm can be installed in the housing of the
20 control drive.

21

22 It is further advantageous that the axial play of a rotor shaft of the electric motor
23 is damped via a leaf spring.

24

Brief Description of the Drawing

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27 An exemplary embodiment of the invention is shown in simplified form in the
28 drawing and described in greater detail in the following description.

25

30 Figure 1 shows a control drive designed according to the invention,
31 Figure 2 shows a potentiometer with potentiometer housing, and

1 Figure 3 shows a driven wheel.

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3 Detailed Description of the Exemplary Embodiment

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5 Figure 1 shows a control drive 1 that comprises a housing 5 and an electric
6 motor 9 that has a rotor shaft 11, on the end 12 of which a worm gear 15 is
7 located.

8

9 The axial play of the rotor shaft 11 is damped by a leaf spring 18 that is integral
10 with the housing 5, for example. The worm gear 15 is coupled to a transverse
11 worm 21. The transverse worm 21 is clamped into the housing 5, for example.
12 The transverse worm 21 is connected directly to a potentiometer 25.

13

14 When a rotor shaft 11 rotates, this brings about a rotation of the driven wheel 30
15 around an axis that projects at a right angle out of the plane of the drawing. This
16 rotation of the driven wheel 30 and, therefore, the potentiometer 25, can be
17 tapped via an electrically conducting potentiometer connection 38. The electric
18 motor 9 also has electric motor connections 35 that are located together with the
19 potentiometer connections 38, for example, in a connector shell 41. The housing
20 5 can be secured to another component using fastening elements 43. The
21 potentiometer connections 38 are clamped into the housing 5 in the vicinity of the
22 connector shell 41.

23

24 The potentiometer 25 is located in a potentiometer housing 47. The
25 potentiometer 25 basically comprises an electrically conducting loop (not shown)
26 and an electrical pickup (not shown), e.g., a wiper. The loop is, e.g., embedded in
27 the potentiometer housing 47. The position of the pickup in relation to the loop is
28 changed by turning either the driven wheel 30 or the potentiometer housing 47.

29

30 The potentiometer housing 47 comprises at least one detent tooth 51 on its
31 circumference, and the housing 5 has at least one detent projection 54, for

1 example. When the potentiometer housing 47 is installed in the housing 5, the at
2 least one detent tooth 51 and the at least one detent projection 54 form a detent
3 toothed 57.

4
5 After the potentiometer 25 is installed in the potentiometer housing 47, a certain
6 home position of the pickup in relation to the loop of the potentiometer 25 should
7 exist. This can be a position at the beginning or the end of the loop, or an
8 intermediate position. The position of the driven wheel 30 is thereby specified by
9 an external adjusting lever and, therefore, the position of the pickup of the
10 potentiometer 25. To reach the home position, therefore, the motor 9 cannot be
11 rotated in such a fashion that a home position is reached, because this would
12 cause the driven wheel 30 to rotate. The potentiometer 47 must therefore be
13 rotated—while overcoming the detent toothed 57—using the loop around an axis
14 extending at a right angle out of the plane of the drawing until a predetermined
15 home position is reached, because this does not cause the driven wheel 30 to
16 rotate. Production-induced tolerances of the potentiometer 25 can therefore be
17 offset.

18
19 For this reason, the potentiometer housing 47 comprises at least one longitudinal
20 hole 60 in the vicinity of the at least one detent tooth 51, for example, that shapes
21 the wall comprising the at least one detent tooth 51 of the potentiometer housing
22 47 in an at least partially elastic design and makes it possible for the
23 potentiometer housing 47 to rotate—when the detent toothed 57 is
24 overcome—by means of manual force, for example. The potentiometer housing
25 47 is sufficiently secured against rotation by means of the detent toothed 57
26 when the mechanical stresses occur to which the potentiometer housing is
27 subjected in a motor vehicle, for example.

28
29 After the electric motor 9, the transverse worm 21, the driven wheel 30, and the
30 potentiometer 25 with the potentiometer housing 47 are installed in the housing 5
31 in a direction of installation 84, an electrical pickup at the potentiometer

connections is used to determine whether the potentiometer 25 is located in the home position. If this is not the case, the potentiometer housing 47 is rotated against the resistance of the detent tooth 57 around a positive or negative angle. This causes the potentiometer 25 to rotate immediately until the potentiometer 25 is located in a predetermined home position, i.e., null balance is present.

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8 Figure 2 shows the potentiometer housing 47 with the potentiometer 25.

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10 The potentiometer connections 38 are designed in the shapes of waves, i.e., they
11 have a serpentine contour 64 that ensure that length will be offset as necessary
12 when the potentiometer housing 47 is rotated, because the serpentine contour 64
13 makes it very easy to extend or contract the potentiometer connections 38. The
14 potentiometer connections 38 comprise an indentation 68, for example, that
15 allows the potentiometer connections 38 to be clamped into the housing 5 and
16 ensures that the ends of the potentiometer connections 38 have a fixed position
17 in the plug connection 41.

18

19 The potentiometer housing 47 has a contoured hole 71 into which the driven
20 wheel 30 grips, e.g., using a pivot with cheeks. The design of the potentiometer
21 25 is made known to one skilled in the art in US-PS 5,794,765, for example, and
22 should be part of the disclosure.

23

Figure 3 shows a driven wheel 30. The driven wheel 30 comprises a contoured hole in the center that has a torx shape, for example. This allows an adjusting lever provided with a congruently designed shoulder to be fixed radially and matched to an unequivocal position. An undercut 78 is further provided in the contoured hole 74, for example, that serves to catch the shoulder of the adjusting lever, i.e., the undercut 78 forms an axial fixation.

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